

Claims:

1. A multi-dosage liquid pharmaceutical formulation of human growth hormone consisting essentially of human growth hormone at a concentration of from about 5 mg/ml to about 100 mg/ml, 1,2-propylene glycol, an aqueous buffer, a non-ionic surfactant, and a preservative, said pharmaceutical formulation having a tonicity of from about 100 mosm/kg to about 500 mosm/kg and having a pH of from about 6.1 and about 6.3.
2. The pharmaceutical composition according to claim 1, additionally comprising a tonicity-adjusting agent such that the tonicity of the pharmaceutical composition is from about 100 mosm/kg to about 500 mosm/kg.
3. The pharmaceutical formulation according to claim 1 or claim 2, wherein the concentration of human growth hormone is from about 6 mg/ml to 14 mg/ml.
4. The pharmaceutical formulation according to claim 1 or claim 2, wherein the concentration of human growth hormone is about 6.67 mg/ml.
5. The pharmaceutical formulation according to claim 1 or claim 2, wherein the concentration of 1,2-propylene glycol is from about 0.5 mg/ml to about 20 mg/ml.
6. The pharmaceutical formulation according to claim 1 or claim 2, wherein the concentration of 1,2-propylene glycol is from about 5 mg/ml to about 15 mg/ml.
7. The pharmaceutical formulation according to claim 1 or claim 2, wherein the aqueous buffer is selected from the group consisting of a phosphate buffer, a citrate buffer, an acetate buffer and a formate buffer.
8. The pharmaceutical formulation according to claim 1 or claim 2, wherein the aqueous buffer is a phosphate buffer.
9. The pharmaceutical formulation according to claim 1 or claim 2, wherein the aqueous buffer has a concentration of from about 5 mM to about 100 mM.

10. The pharmaceutical formulation according to claim 1 or claim 2, wherein the buffer has a concentration of about 10 mM.
11. The pharmaceutical formulation according to claim 1 or claim 2, wherein the buffer is a phosphate buffer having a concentration of about 10 mM.
12. The pharmaceutical formulation according to claim 1 or claim 2, wherein the non-ionic surfactant is selected from the group consisting of a poloxamer, a Pluronic® polyol and a polysorbate.
13. The pharmaceutical formulation according to claim 1 or claim 2, wherein the non-ionic surfactant is a poloxamer.
14. The pharmaceutical formulation according to claim 1 or claim 2, wherein the poloxamer is poloxamer 188.
15. The pharmaceutical formulation according to claim 1 or claim 2, wherein the non-ionic surfactant is present at a concentration of from about 0.05 to about 4 mg/ml.
16. The pharmaceutical composition according to claim 1 or claim 2, wherein the non-ionic surfactant is present at a concentration of about 2 mg/ml.
17. The pharmaceutical composition according to claim 1 or claim 2, wherein the non-ionic surfactant is poloxamer 188 being present at a concentration of about 2 mg/ml.
18. The pharmaceutical formulation according to claim 1 or claim 2, wherein the preservative is selected from the group consisting of benzyl alcohol, meta-cresol, methyl paraben, propyl paraben, phenol, benzalkonium chloride, benzethonium chloride, chlorobutanol, 2-phenoxyethanol, phenyl mercuric nitrate and thimerosal.
19. The pharmaceutical formulation according to claim 1 or claim 2, wherein the preservative is benzyl alcohol.

20. The pharmaceutical formulation according to claim 1 or claim 2, wherein the preservative is benzyl alcohol being present at a concentration of from about 7 mg/ml to about 12 mg/ml.

21. The pharmaceutical formulation according to claim 1 or claim 2, wherein the optional tonicity-adjusting agent is selected from the group consisting of a sugar, a sugar alcohol, a further polyol, a neutral salt, and an amino acid.

22. The pharmaceutical formulation according to claim 19, wherein the tonicity-adjusting agent is mannitol.

23. The pharmaceutical formulation according to claim 1 or claim 2, said pharmaceutical composition being substantially isotonic.

24. The pharmaceutical formulation according to claim 1, said pharmaceutical composition having a pH of about 6.2.

25. The pharmaceutical formulation according to claim 1 or claim 2, essentially consisting of 6.67 mg/ml human growth hormone, from about 6 mg/ml to 15 mg/ml propylene glycol, 10 mM sodium phosphate buffer, 2 mg/ml poloxamer 188, where necessary mannitol at a concentration sufficient such that the formulation is substantially isotonic, and having a pH of 6.2.

26. The pharmaceutical composition according to claim 1 or claim 2, essentially consisting of 6.67 mg/ml human growth hormone, 6 mg/ml propylene glycol, 10 mM sodium phosphate buffer, 22.5 mg/ml mannitol, 2 mg/ml poloxamer 188, and having a pH of 6.2.

27. The pharmaceutical composition according to claim 1 or claim 2, essentially consisting of

6.67 mg/ml human growth hormone,
9 mg/ml propylene glycol,
10 mM sodium phosphate buffer,
8.1 mg/ml mannitol,
2 mg/ml poloxamer 188,
and having a pH of 6.2:

28. The pharmaceutical composition according to claim 1, essentially consisting of
6.67 mg/ml human growth hormone,
12.4 mg/ml propylene glycol,
10 mM sodium phosphate buffer,
2 mg/ml poloxamer 188,
and having a pH of 6.2.

29. A kit comprising an injection device and a separate container containing a multi-dosage liquid formulation of human growth hormone according to claim 1 or claim 2.